BERGGREN

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REPLY TO WRITTEN OPINION
INTERNATIONAL PATENT APPLICATION PCT/FI2003/000812
APPLICANT: SUOMEN VILJAVA OY
DUE DATE: 17 OCTOBER 2004

With reference to the written opinion dated 19.08.2004 we enclose herewith a set of new claims replacing those previously on file and respectfully ask to submit the following.

The new method claim 1 has been restricted to the manufacture of an oat product by defining the starch as avenaceous (oat) starch and the lipid as fat from oat grains. Support for the amendment may be found from page 1, lines 24 – 29, and page 4, lines 7 – 12, of the description and the original claims 11 and 13. As a further amendment the maximum temperature of the material during the treatment is now recited to be about 105°C, which is based on the original claim 7.

The new subclaims 2 – 12 correspond to the original claims 2 – 6, 8 – 10 and 12 – 14.

The new claim 13 to a product, replacing the original claims 16 and 17, has been restricted to an oat product in line with the new claim 1. In the new claim 14, replacing the original claim 18, the fat content has been amended to correspond to that in the original claim 12. The new claims 15 – 18 correspond to the original claims 19 – 21 and 23.

In the applicant´s opinion the new claims clearly distinguish the invention from the cited references D1 and D2. Neither of the references makes any mention of oat starch or oat products the invention is particularly dealing with. As discussed in the description, oat starch has a small granule size as well as an exceptionally high fat content that cause problems in the manufacture of oat products. The small granule size makes the material difficult to handle, and the fat is prone to oxidation thereby spoiling the product. The invention seeks to solve these problems, which are not addressed to in either of the two references D1 and D2.

More particularly, the invention comprises treatment of oat material containing starch and fat originating from oat grains, in which starch granules are damaged so as to release their amylose and amylopectin contents into contact to the fat present in the material, the resulting complexing between these ingredients reducing the tendency of the material to get rancid, while the starch released from the damaged granules works as a binder integrating the granules to a drying mass that can finally be brought to a desired particle size e.g. by grinding.

D1 is a study on thermal conversion of starch-containing material including production of amylose-lipid complexes in the process. There are listed various starch sources, including cereal starches where the fat or lipid content is in fact relatively low, about 1%. Such materials are not subject to rancidity problems comparable to those of oat products, the oat grain endosperm fat content being in the order of 6 to 8%. According to D1 the conversion of the material takes place at a temperature of 140°C without shear. As no shear forces are present, the starch granules preserve their integrity, the amylose capable of complexing with lipid being mobilized by heating. Amylose is said to leach out from the granules and complex with surface lipid to form an insoluble film onto the granule surfaces. This is teaching away from the invention, in which the starch granules are damaged so as to liberate amylose and amylopectin therefrom, to freely complex with the high fat present in oat material and work as a binder to integrate the small-size granules. A water-repellent film maintaining granular integrity as taught by D1 would be a hinder to effective complexing and the binding effect produced by liberated starch as sought by the invention.

A significant difference between the invention and D1 is the maximum temperature of about 105°C now required in claim 1. In experiments performed by the inventors using high-fat oat materials the process turned out to be unworkable at higher temperatures, due to fat rancidity problems (see the description, page 3, lines 31 – 33, page 7, lines 20 – 22, and page 9, lines 26 - 28. Without a mention of oat materials or the rancidity problem, and teaching a much higher temperature D1 fails to suggest the invention to a skilled person in regard of these aspects.

D2 describes a thickener consisting of flour, starch and fat components, some auxiliary ingredients as well as water. According to the teachings the different components are derived from different sources, the flour being wheat flour, the starch being e.g. potato, wheat or corn starch, and the fat being vegetable oil or animal fat, see page 4, claims 4 and 14. This is remote from the invention, in which starch and fat both stem from oat grain material and the invention involves binding these ingredients to withstand detrimental oxidation and rancidity and turn the material into a manageable form.

On the above grounds we ask the examiner to reconsider the invention, and hope that presence of novelty and an inventive step in the new claims may now be acknowledged.

Yours faithfully,
BERGGREN OY AB

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Patent Attorney

ENCLS New claims

Claims

1. A method for manufacturing a starch-containing oat product in particle form, **characterized** in that a material containing avenaceous starch granules and fat from oat grains is moistened, the material is treated so as to damage the starch granules and to partially release their amylose and amylopectin so that fat is bound to them, the temperature of the material during the treatment being not more than about 105 °C, the plastic mass obtained by the treatment, wherein the damaged starch acts as a binder, is dried and the dried mass is broken up in particles.

2. A method according to Claim 1, **characterized** in that the material to be moistened, which forms the starting material, is powdery.

3. A method according to Claim 1 or 2, **characterized** in that the material is moistened to a moisture content of about 21 – 26%.

4. A method according to any of the preceding claims, **characterized** in that the starch is damaged by means of leading the moistened material through an extruder or an expander.

5. A method according to any of the preceding claims, **characterized** in that the amount of energy used for damaging the starch is 22 – 30 kWh/1000 kg of material.

6. A method according to any of the preceding claims, **characterized** in that in connection with moistening, the material is heated so that partial damage to the starch is caused.

7. A method according to any of the preceding claims, **characterized** in that the material is treated so that the degree of damage to the starch granules is about 30 – 60%.

8. A method according to any of the preceding claims, **characterized** in that the dried mass is disintegrated by means of grinding so as to form granules.

9. A method according to any of the preceding claims, **characterized** in that the particle size of the end product is larger than that of the starting material that is moistened.

10. A method according to any of the preceding claims, **characterized** in that the starting material that is to be moistened is oat meal having a starch content of at least about 50%, preferably about 70 – 90%, and the fat content about 5 – 8%

11. A method according to any of Claims 1-9, **characterized** in that the moistened starting material is constituted by starch granules, which contain starch and fat and have been separated from the other ingredients of the oat grains.

12. A method according to any of Claims 1-9, **characterized** in that the moistened starting material contains avenaceous starch or oat meal combined with a carrier in particle form.

13. A starch-containing oat product in particle form, which can be manufactured by a method according to any of the preceding claims, **characterized** in containing damaged avenaceous starch, wherein the amylose and amylopectin of the starch granules are partially released, while the starch acts as a binder that keeps the particles together, and fat from oat grains, which in the product are essentially fully bound into complexes.

14. A product according to Claim 13, **characterized** in that the starch content of the product is at least 50% and the fat content about 5-8 %.

15. A product according to Claim 13 or 14, **characterized** in that the degree of damage to the starch granules is 30 – 60%.

16. A product according to any of Claims 13 to 15, **characterized** in that there are undamaged starch granules left in the product.

17. A method according to any of Claims 13 to 16, **characterized** in that the product is constituted by grains, the sizes of which are mainly in the range of 0.25 – 2.0 mm.

18. The use of a product manufactured according to any of Claims 1 to 12 or that of a product in particle form according to any of Claims 13 to 17 in foodstuffs, such as bakery products.